

REMARKS

The Examiner has examined claims 1, 4, 5, 13, 15, 23, and 24. All other claims have been withdrawn due to an election of species requirement. Applicants note that the Office Action Summary form is missing a reference for claim 15.

Of the examined claims, claims 1, 13 and 24 are independent claims. Claim 23 is canceled.

Drawings

Figures 15-21 have been objected to for not showing a legend. Accordingly, Applicants provide replacement sheets showing Figures 15-21 corrected to show a legend "Conventional Art." Applicants request that the objection be reconsidered and withdrawn.

Claim Objections

Claims 1 and 5 have been objected to for minor informalities. Accordingly, Applicants have amended claims 1 and 5 in order to address the minor informalities. Applicants request that the objection be reconsidered and withdrawn.

§ 101 Rejection

Claim 23 has been rejected under 35 U.S.C. § 101. Accordingly, Applicants cancel claim 23, rendering the rejection no longer applicable.

§ 103(a) Rejection – Lee, Ide

Claims 1, 13, 23, and 24 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 7,095,393 (Lee) in view of U.S. Patent 6,753,831 (Ide). Applicants respectfully traverse this rejection.

According to the present specification, conventional LCDs cannot easily support moving images on account of a slow response speed.

A known solution has been to, provided a combination of input image data of the directly previous frame and input image data of the current frame, supply a drive voltage that is higher (in the case of overshoot) or lower (in the case of undershoot) than a gray level voltage of predetermined input image data of the current frame to a liquid crystal display panel. This driving method is referred to as “overshoot (OS) drive”.

In addition, while CRTs reproduce images by performing interlace scanning, typical liquid crystal display apparatuses reproduce images by progressive scanning. Subsequently, an input interlace video signal is converted to a progressive video signal (i.e. I/P conversion) before being supplied to the liquid crystal display panel.

However, this I/P conversion produces flicker noise (false signal), and an oblique line appears as jaggies (a series of light and dark patterns).

Embodiments of the present invention represent a solution to this I/P conversion problem in a liquid crystal display device provided with the overshoot drive.

CLAIM 1

In particular, claim 1 is directed to a liquid crystal display apparatus, that includes among other things, “signal type detection section” for detecting whether a signal type input image data is a progressive signal or an interlace signal, “I/P conversion section,” and “enhancing conversion section,” in which in accordance with a result of detection by the signal type detection section, a degree of the enhancing conversion of the image data by the enhancing conversion section being varied.

Applicants submit that Lee and Ide, either alone or in combination, fail to disclose the claimed "signal type detection section."

The Office Action admits that Lee does not disclose a signal type detection section (page 5 of the Office Action), and instead relies on Ide for making up for this deficiency. In particular, the Office Action states that Ide teaches a INPUT VIDEO SELECTING SIGNAL (Fig. 1).

To the contrary, the claimed invention requires a "signal type detection section for detecting whether a signal type of the input image data is a progressive signal or an interlace signal." Ide discloses no such structure or equivalent thereof. Applicants submit that Ide's signal is not a structure that detects the type of signal. Rather, it is merely a signal.

For at least this reason, Applicants submit that the rejection fails to establish *prima facie* obviousness and must be withdrawn.

In addition, the Office Action alleges that Lee discloses an enhancing conversion section, but admits that Lee does not disclose an I/P conversion section and varying the degree of the enhancing conversion of the image data by the enhancing conversion section based upon whether the input image data is a progressive signal or an interlace signal. Instead, the Office Action alleges that Ide discloses varying the degree of the enhancing conversion of the image data by the enhancing conversion section. Applicants disagree.

Applicants agree that Lee discloses an enhancing conversion section and does not disclose an I/P conversion section. Because Lee does not disclose an I/P conversion section, Lee does not encounter a problem of the overshoot drive when an interlace signal is converted to progressive signal.

Ide is directed to a plasma display panel (termed "PDP"), or an electroluminescence display panel, and solution of particular problems that occur in these types of display (see column 1, lines 41-45). Ide disclose an example embodiment of a PDP 10. A solution provided by the disclosed embodiment in Ide is that in switching between the PC VIDEO SIGNAL which

is a progressive signal and the NTSC TV SIGNAL which is an interlaced signal, the display panel is temporarily stopped from being driven for a period when parameters for the switching transfer, so that switching is prevented from being affected by radiation noise at the image displaying (see Fig. 3 and related description; col. 6, lines 41-49).

Applicants submit that one of ordinary skill in the art would understand that unlike the LCD display of the present invention as well as in Lee, the self-emissive display, such as the plasma display panel or electroluminescence display, would not be provided with an overshoot drive which is used in LCD displays having capacitive pixels.

Thus, Applicants submit that even if Lee and Ide were to be combined, they would still not teach or even suggest varying the degree of the enhancing conversion of the image data by the enhancing conversion section. Lee's LCD does not encounter a problem with the overshoot drive (claimed enhancing conversion section) when an interlace signal is converted to progressive signal. Ide's PDP has no need for an overshoot drive and subsequently, also does not encounter a problem with the overshoot drive in the case of conversion of an interlace signal.

Accordingly, Lee and Ide, either alone or in combination, neither encounter the problem solved in the present invention nor disclose the structure of the present invention representing a solution to the problem. For at least these reasons, Applicants submit that Lee and Ide fail to teach the claim as a whole including, among other things,

"signal type detection section for detecting whether a signal type of input image data is a progressive signal or an interlace signal," and

"in accordance with a result of detection by the signal type detection section, a degree of the enhancing conversion of the image data by the enhancing conversion section being varied."

For these same reasons, Applicants submit that Lee and Ide fail to teach claim 13 as a whole including, among other things,

"(i) detecting whether a signal type of input image data is a progressive signal or an interlace signal;

(ii) converting the interlace signal to image data that is a progressive signal, if the input image data is an interlace signal; and

(iii) subjecting the image data to the enhancing conversion, in a direction of gray level transition,

in accordance with a result of detection of the signal type, a degree of the enhancing conversion of the image data being varied.”

For these same reasons, Applicants submit that Lee and Ide fail to teach claim 24 as a whole including, among other things,

“the program causing the computer to perform a step of varying a degree of the enhancing conversion of the image data, in accordance with a result of detection of whether a signal type of input image data is a progressive signal or an interlace signal.”

These arguments apply as well to respective dependent claims.

Applicants request that the rejection be reconsidered and withdrawn.

§ 103(a) Rejection – Lee, Ide, Nitta

Claims 4, 5, and 15 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Lee, Ide, and further in view of JP 2003-143556 (Nitta; provided with an IDS). Applicants respectfully traverse this rejection.

The same deficiencies as in the above for claim 1 apply as well to claims 4, 5, and 15. For at least the reasons above for claim 1, Applicants submit that the rejection fails to establish *prima facie* obviousness for claims 4, 5, and 15, as well.

Furthermore, Nitta fails to make up for the above-stated deficiencies in Lee and Ide.

Nitta discloses, in a display device which performs interlace/non-interlace conversion and overdrive processing, a liquid crystal display control for a high-definition movie with low pass by using a memory for the conversion and overdrive processing (see para. 0007).

However, Nitta does not disclose the problem with the overshoot drive when a signal type of input image data is an interlace signal and the interlace signal is converted to the progressive signal.

Instead, in Nitta, when overdrive processing (which corresponds to the overshoot processing of the present invention) produces a drawback, the overdrive processing is not allowed (see, for example, claim 8). Therefore, if the interlace signal is converted to the progressive signal, the overshoot processing is not performed for a progressive signal that is converted from the interlace signal. Thus, Nitta does not make up for the deficiencies in Ide and Lee.

The present invention solves a problem that occurs when the interlace signal is converted to the progress signal and the overshoot drive is performed. Applicants submit that even provided the combination of Lee, Ide, and Nitta, the present invention would not have been obvious at the time of the invention.

Applicants request that the rejection be reconsidered and withdrawn.

CONCLUSION

In view of the above amendment, applicant believes the pending application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Robert W. Downs Reg. No. 48,222 at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.147; particularly, extension of time fees.

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Respectfully submitted,

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Attachment: Drawings